NAVAL HEALTH RESEARCH CENTER

DEPARTMENT OF DEFENSE BIRTH DEFECTS REGISTRY REPORT FOR THE PERIOD: JANUARY 1, 1999 THROUGH JUNE 30, 1999

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Department of Defense Birth Defects Registry
Report for the Period: January 1, 1999 Through June 30, 1999

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SUMMARY

Major birth defects occur in 3–5% of the population and are responsible for 21% of infant deaths in the United States. They have become the leading cause of infant mortality and are the sixth leading cause of potential life lost.

Monitoring birth defects is essential and consistent with the military's desire to provide the best health care for families. As the proportion of women in the military has increased, many questions have been raised regarding their reproductive health, including the risk of having a child with birth defects. Tracking demographic and response data is vital to identifying defect clusters and to establish causal relationships between congenital defects and teratogens.

On January 1, 1999, the Department of Defense established a Birth Defects Registry at the Naval Health Research Center, San Diego, California. This registry combines health record abstraction (active surveillance) with screening of Department of Defense electronic medical data (passive surveillance), to create a cost-effective surveillance program for the geographically dispersed military population. This first Birth Defect Registry Report documents surveillance findings through June 30, 1999. In the future, annual reports will be published in June and cover the previous calendar year.

During this six-month period, 46,171 live births were delivered to Department of Defense families. Among these infants, 4.4% (95% CI, 4.3–4.6) were diagnosed with one or more of 45 major congenital malformations. Cardiovascular malformations were the most common defects. Male infants had a higher proportion of any type of congenital malformations than female infants (56.9% vs. 43.2%). Babies from Marine Corps families had an unadjusted higher proportion of major birth defects (4.7%) compared with those of other branches of the uniformed services.

PROGRAM OVERVIEW

Background

Major birth defects occur in 3–5% of the population and are responsible for 21% of infant deaths in the United States.[1] Birth defects have become the leading cause of infant mortality and are the sixth leading cause of potential life lost.[2,3] The combined estimated lifetime cost for individuals born with birth defects is $8.0 billion annually.[4]

Although no national US birth defects registry currently exists, many states have established birth defects registries. These registries collect comprehensive information on children with birth defects, often leading to epidemiological studies, public health interventions to reduce morbidity, and improved prenatal care. In effect, birth defects surveillance is becoming a "standard of care" for state public health departments.

As the proportion of women in the military has increased, many questions have been raised regarding their reproductive health, including the risk of having a child with birth defects. For example, at what point in a woman's pregnancy should she be restricted in her military duty assignment? Which occupational exposures are dangerous? The many allegations of reproductive morbidity associated with the Gulf War are well-known examples of increasing concern for both military women and men regarding possible occupational exposures and birth defects.[5,6]

State birth defect registries cannot easily be used to study birth defects among military families. Few states have data from military hospitals. Frequently, civilian hospital data cannot be readily linked to US military populations because, to protect privacy, the registries often do not retain personal identifying information, such as social security numbers. Although several large exploratory studies of reproductive outcomes associated with the Gulf War have been and are currently being conducted,[7,8] prior to this project, a military birth defects registry had not been initiated.

Tracking demographic and response data is vital to identifying defect clusters and to establish causal relationships between congenital defects and teratogens. Determining the populations at greatest risk for defects will allow early intervention and more effective treatment of defects. Such data will facilitate the improvement of diagnosis and treatment of birth defects. Finally, the calculation of birth defect prevalence rates and their statistical associations with behavioral and environmental exposures will provide guidance in making appropriate treatment decisions and in allocating resources.[1] Monitoring congenital defects is essential and consistent with the military's desire to provide the best health care for families.

The Birth Defects Registry

The Assistant Secretary of Defense for Health Affairs established National Surveillance for Birth Defects among Department of Defense (DoD) Families on November 17, 1998.[9] The Department of Defense Birth Defects Registry (BDR) provides systematic surveillance of DoD beneficiary births and estimates birth defect prevalence.

Building upon birth defect registry procedures established by the Centers for Disease Control and Prevention (CDC) and

the California Birth Defects Monitoring Program, the Naval Health Research Center (NHRC), San Diego, California, conducted a birth defects registry feasibility study in 1998.[10] Using information gathered during that study, a hybrid surveillance system was created that uses both available electronic data and medical chart review to track DoD-wide births.

The BDR's passive surveillance consists of screening worldwide DoD electronic inpatient, outpatient, and Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) data for infants with birth defect case diagnoses. This passive surveillance is supplemented with thorough active surveillance of infants born at the largest DoD medical center, Naval Medical Center, San Diego (NMCSD), by reviewing various medical charts, clinic records, and clinical consultations.[11]

Case Definition

To meet the case definition for inclusion in the BDR, all of the following must be true:

1. The infant or fetus* must have a major structural or genetic birth defect. Major defects are generally those that can adversely affect health and/or development. The majority of such anomalies fall within the *International Classification of Disease, Ninth Revision, Clinical Modification* (ICD-9-CM) classification scheme of codes 740.0-759.9. Infants who have only minor defects (ie, those who pose no significant health or social burdens) are excluded. Defects classified as major by the BDR are listed in Appendix A.

2. At least one parent must be receiving DoD Military health care benefits at the time of birth. Eligibility is determined by enrollment in Defense Enrollment Eligibility Reporting System (DEERS).

3. The major defect must be diagnosed before the infant's first birthday. More than 95% of malformations will be evident by the first year of life.[12]

4. The infant or fetus must have a gestational age of at least 20 weeks by the best available measure. In the absence of an age estimate, the infant or fetus must have a birth weight of at least 500 grams.

Passive Surveillance

The BDR staff uses the following data sources:

Personnel records, active military service: The Defense Manpower Data Center (DMDC), Seaside, California, is the official archive of personnel information for the DoD. DMDC maintains electronic files for all individuals currently in active military service as well as exact dates of individual accessions to and discharges from active military service.

Demographic records: DEERS maintains personal and demographic information for DoD personnel and their dependents. The names and numbers of those newly enrolled are compared with the livebirth information downloaded from the case sources. This process identifies missed

*Fetus (fē'tŭs) 2. [NA]. In humans, the product of conception from the end of the eighth week to the moment of birth. Spraycar M, ed. *Stedman's Medical Dictionary*. 26th Ed. Baltimore, MD: Williams & Wilkins;1995.

infants and permits tracking within the system.

Hospitalizations (military treatment facilities worldwide): Fort Detrick, Frederick, Maryland, maintains the electronic repository for all inpatient encounters at military medical treatment facilities. Hospital discharge diagnoses are coded in ICD-9-CM format and the data are extracted, along with other specified variables, into a *Standardized Inpatient Data Record* (SIDR). SIDR data are collected and maintained at Fort Detrick in the form of SAS (SAS Institute, Inc., Cary, NC) data sets. Included in DoD hospital data are the length of hospital stay, medical discharge diagnoses, date of birth, and sponsor identification number. The inpatient records are available for active-duty and retired personnel, along with their beneficiaries.

Outpatient (ambulatory) visits (military treatment facilities worldwide): As with the inpatient data, Fort Detrick maintains the electronic repository for all outpatient encounters. Diagnoses are coded in ICD-9-CM format and the data are extracted, along with other specified variables, into a *Standardized Ambulatory Data Record* (SADR). SADR data for outpatient services at military medical facilities include ICD-9-CM diagnostic codes, procedure codes, date of birth, sponsor identification number, facility identification, and provider identification. The outpatient records are available for active duty and retired personnel, as well as their beneficiaries.

Hospitalizations (civilian treatment facilities worldwide): Standard Technology, Inc., the contractor for Tricare Management Activity, Falls Church, VA, maintains the billing records for Civilian Health and Medical Program of the Uniformed Services (CHAMPUS). These data contain a record for each CHAMPUS encounter with a civilian provider. Included in these data are the length of hospital stay, discharge diagnoses coded in ICD-9-CM format, date of birth, sponsor identification number, and social security number (other than for an infant). The inpatient records are available for beneficiaries (military dependents, retirees, and their dependents) enrolled in CHAMPUS.

Outpatient (ambulatory) visits (civilian medical treatment facilities worldwide): Standard Technology, Inc., maintains the billing records for all CHAMPUS outpatient encounters. The data for outpatient services at civilian medical facilities also include the ICD-9-CM diagnostic codes, social security number (other than for a young infant), date of birth, sponsor identification number, facility identification, and provider identification. The outpatient records are available for the aforementioned beneficiaries enrolled in CHAMPUS.

Active Surveillance

Active birth defect surveillance is conducted at the DoD's largest medical facility, Naval Medical Center San Diego (NMCSD). Reports generated by the medical records department are used to identify infants with reportable defects or who have certain characteristics thought to be associated with the presence of codable defects. Abstractors review inpatient and outpatient records for both the mother and the case infant.

The active surveillance system primarily is used to validate the data gathered in the passive system. This validation is achieved using two methods.

First, the data are used to confirm that cases identified by active surveillance were reported by passive surveillance methods. Secondly, the data are used to estimate how many cases reported as defects in the passive surveillance are not in fact eligible birth defects. By performing these validity checks of the data, the Registry is better able to estimate the amount of overreporting and underreporting in the passive surveillance system.

Confidentiality

Although personal identifiers are used in the Birth Defects Registry, they are protected such that no infant is identified in any report. Records and computer files are maintained in accordance with DoD regulations. Files are kept in locked cabinets and computer access is password secured and limited to members of the registry staff. The NHRC Committee for the Protection of Human Subjects reviews the confidentiality procedures annually.

Preliminary Results

Population

Infants born to members on active duty in the uniformed services and their dependents, retirees and their dependents and survivors are eligible for inclusion in this Registry. The Army, Navy, Air Force, Marine Corps, Coast Guard, Public Health Service, and the National Oceanographic and Atmospheric Administration make up the uniformed services.

While detailed demographic information has not yet been analyzed for the infants in the BDR, the Department of Defense does publish this information for active-duty military personnel (Army, Navy, Air Force, and Marine Corps only). As of December 31, 1998, one day prior to the inception of the BDR, 1,373,651 people were on active duty in the four branches. Of those, 33.3% were considered minorities (Black, Hispanic, or other). The Army had the highest percentage of minorities (40.1%) and the Air Force the lowest (24.5%) [13]. Based on 1990 US Census data, all branches of the military had a greater percentage of minorities than the nation as a whole (19.7%).[14]

Women make up just over 51% of the general population.[14] In the military, however, those numbers are dramatically different. Approximately 14% of the active-duty force are women, a percentage that has increased over a short period of time.[15] In contrast, 90% of military spouses are women. The percentage of female children in the military is similar to that of the general population (roughly 50%).[15]

Passive Surveillance

Preliminary analysis was conducted on the data collected to date. These data represent crude rates, meaning that they have not been adjusted for maternal age, race, or other possible covariates. All cases picked up in passive surveillance were counted without confirmation of actual defect status.

During the time period January 1 through June 30, 1999, there were 46,171 medical encounters coded as livebirths. The prevalence of major birth defects by service is listed in Table 1. More than 40% of the livebirths were Army dependents. The prevalence rates of major birth defects ranged from 4.1 to 4.7%, with a DoD-wide prevalence of 4.4 [95% CI (4.3–4.6)]. The

Marine Corps had the highest (unadjusted) prevalence rate (4.7%).

Table 2 demonstrates the prevalence of specific major birth defects by sex. Major birth defects were more frequent in male infants (56.9% vs. 43.2%). This difference is largely explained by the number of cases of hypospadias and epispadias, both defects of the male genitalia. After removing hypospadias and epispadias from the calculations, males comprised 52.2%, and females 47.8%, of birth defect cases.

The prevalence of specific major birth defects by branch of service is illustrated in Table 3. As with the general population, cardiac malformations were the most common defects reported for all branches of service.[16]

Results – Active Surveillance

Between January 1 and June 30, 1999, there were 1707 livebirths at Naval Medical Center San Diego (NMCSD). Of those births, 121 birth defect infant cases were identified and abstracted, and 41 were found to have major birth defects. When the electronic data for this geographical area were compared, there was a complete match among 35 of the cases (85%). Among the six cases that did not match, three did not match because they had been coded with different family member suffixes within the sponsor identification, (eg, as the third child rather than the second). One child had a different sponsor identification number. It is unclear why the other two cases did not match. When the birth defects diagnoses in the two surveillance systems were compared there was 91% agreement.

In the future we plan to verify passive surveillance birth defects detection by comparison with active surveillance techniques.

Limitations

BDR staff use multiple sources of data in an attempt to capture all birth defect cases. As with other passive birth defects registries, this system has limitations, including:

- The BDR relies on data coded for purposes other than birth defects surveillance. For the purpose of this Registry, it is assumed that medical data relevant to birth defects surveillance are (a) routinely and completely collected, systematically coded, and accurately entered in an automated database; and (b) reported in a timely manner.

- Some birth defects are not recognized during the birth hospitalization and do not require subsequent hospitalization. Additionally, a small percentage of births do not occur in hospitals. Although the system collects outpatient information, if the defect is not coded in an office visit, the defect will not be reported to the BDR.

- Certain diagnoses are not clinically evident before one year of age. Conditions that are more likely to be identified as the child grows may be underascertained, because all cases must be diagnosed by one year of age to be counted.

- Fetuses of less than 20 weeks' gestation are excluded by case definition. The BDR does not capture subclinical fertility loss and has little information regarding miscarriages and terminations. Some pregnancies that would have

resulted in an infant with a birth defect may be terminated when diagnosed *in utero.*

- A passive system, which tends toward underreporting of minor abnormalities, may capture only sentinel problems.

- Strict inclusion/exclusion criteria must be met for certain conditions to be called true birth defects. By relying on ICD-9-CM codes alone, without review of medical records, overreporting of these conditions may occur.

- Missing only a few cases of a rare condition will strongly influence rates.

Limitations specific to the DoD Birth Defects Registry include:

- An unknown number of infants who are born while considered a military beneficiary are later diagnosed when their parents are no longer receiving military benefits. These birth defects will be missed.

- Parents with dual medical care opportunities may choose civilian health care systems over military health care. Their infant's birth would not be captured.

The denominator used to calculate rates is based on the number of livebirths to DoD beneficiaries. An unknown number of birth defect infants are identified during the first year of life who are not captured in the denominator. These infants include:

- adoptees and stepchildren;

- infants of unwed parents (mother not eligible for benefits for delivery; infant eligible following birth);

- other infants born outside of the military medical system; and

- those who were not eligible for benefits at the time of birth but became eligible during the first year of life.

Despite its limitations, the BDR is an important tool for monitoring birth defects within the DoD. While it may not be possible to determine exact rates of birth defects in a passive surveillance system, these data can be used to monitor changes in time or geographic differences.[17] Additionally, these data may be used to provide baseline rates for future inquiries, including reports of clusters or suspected environmental exposures. Determining the populations at greatest risk for defects will allow early intervention and prevention methods to be employed.

Future Analysis

Based on observations from the pilot study, complete data for 1999 births should be available in the spring of 2001.[10] Future analysis of these data will include adjustments for race and maternal age. Prevalence rates for infants of active-duty women will be compared with those of dependents. Additionally, rates for infants born to enlisted members of the service will be compared with those for officers.

Efforts will be made to get detailed occupational exposure information for women who become pregnant while on active duty. Comparisons will be made

between Navy women assigned to sea duty and those assigned to shore duty.

Even after adjusting for covariates such as race and maternal age, birth defect rates can vary by geographic area. For example, the Centers for Disease Control and Prevention report an increasing prevalence of neural tube defects (spina bifida and anencephalus) from western to eastern states.[17] Although it will be very difficult to examine the geographic trends in birth defects of the dynamic military population, doing so may provide a better estimate of the population most in need of intervention. Several variations of this geographical analysis would have to be performed, including by permanent residence (to account for genetic factors) and by duty station at estimated time of conception (to account for possible environmental exposures). Other variables associated with geography, such as nutritional differences, would be difficult to measure without more complex epidemiologic studies.[17]

As with allegations following the Gulf War, future deployments will likely raise concerns for the reproductive health and wellbeing of the servicemembers. Using baseline data from the BDR, the Department of Defense will be able to respond rapidly to reports of increased birth defects or suspected exposure to teratogenic agents. Additionally, these data will be valuable for identifying groups at risk for adverse reproductive outcomes and allow the DoD to target those groups for prevention and intervention programs.

Conclusion

Monitoring congenital defects is essential to and consistent with the military's desire to provide the best health care for families. The establishment of the National Department of Defense Birth Defects Registry is an important step in achieving this goal. While it is premature to base policy decisions on these early and limited birth defect data, continued collection will provide baselines rates for comparison with other registries, evaluation of cluster reports, and analysis of temporal and geographic trends. These data will be vital for future public health studies, prevention efforts, and health policy decisions.

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Appendix A. List of Major Birth Defects

ICD-9 Code	Birth Defect
740.0/740.1	Anencephalus
741.1/741.9	Spina bifida
742.0	Encephalocele
742.1	Microcephalus
742.3	Hydrocephalus without spina bifida
743.0/743.1	Anophthalmia/microphthalmia
743.30–743.34	Cataract
743.5	Aniridia
744.01/744.23	Anotia/microtia
745.0	Common truncus
745.1	Transposition of great arteries
745.2	Tetralogy of Fallot
745.4	Ventricular septal defect
745.5	Atrial septal defect
745.6	Endocardial cushion defects
746.01-746.02	Pulmonary valve atresia or stenosis
746.1	Tricuspid valve atresia and stenosis
746.2	Ebstein's anomaly
746.3	Aortic valve stenosis
746.7	Hypoplastic left heart syndrome
747.0	Patent ductus arteriosus
747.1	Coarctation of aorta
747.3	Anomalies of pulmonary artery
748.0	Choanal Atresia
748.5	Lung agenesis/hypoplasia/dysplasia
749.0	Cleft palate
749.1-749.2	Cleft lip with or without cleft palate
750.3	Tracheoesophageal fistula, esophageal atresia and stenosis
751.2	Atresia and stenosis of large intestine, rectum and anal canal
750.5	Pyloric stenosis
751.3	Hirschsprung's disease
751.6	Biliary atresia
752.6	Hypospadias and epispadias
753.0	Renal agenesis/dysgenesis
753.2/753.6	Obstructive genitourinary defects
753.5	Bladder exstrophy
754.30/.31/.35	Congenital hip dislocation
755.20 –755.29	Reduction deformity upper limbs
755.3	Reduction deformity lower limbs
756.6	Anomalies of diaphragm
756.7	Anomalies of abdominal wall
758.0	Down syndrome
758.1	Trisomy 13
758.2	Trisomy 18
760.71	Fetal Alcohol Syndrome

Table 1. Prevalence of Major Birth Defects by Branch of Service

Service	Livebirths	Infants w/ Birth Defects	Prevalence (%)	95% CI*
Army	18,702	850	4.5	(4.3-4.8)
Navy	10,503	465	4.4	(4.0-4.8)
Air Force	10,959	459	4.2	(3.8-4.6)
Marine Corps	4,778	225	4.7	(4.1-5.3)
Other †	1,229	50	4.1	(3.0-5.1)
Total	46,171	2,049	4.4	(4.3-4.6)

* Indicates confidence interval.
† Includes Coast Guard, Public Health Service, and National Oceanographic and Atmospheric Administration personnel.

Table 2. Prevalence of Specific Major Birth Defects by Sex

ICD-9 Code(s)	Malformation	Number	Total Prevalence*	Total Male	Total Female	Prevalence Male	Prevalence Female	Male/Female Ratio
740.0/740.1	Anencephalus	7	0.15	4	3	0.16	0.14	1.15
741.1/741.9	Spina Bifida	21	0.45	11	10	0.44	0.47	0.95
742.0	Encephalocele	10	0.22	4	6	0.16	0.28	0.58
742.1	Microcephalus	21	0.45	13	8	0.52	0.37	1.40
742.3	Hydrocephalus w/o Spina Bifida	58	1.26	36	22	1.45	1.03	1.41
743.0/743.1	Anophthalmia/microphthalmia	6	0.13	2	4	0.08	0.19	0.43
743.30-743.34	Cataract	13	0.28	4	9	0.16	0.42	0.38
743.5	Aniridia	1	0.02	1	0	0.04	0.00	- -
744.01/744.23	Anotia/microtia	7	0.15	4	3	0.16	0.14	1.15
745.0	Common truncus	11	0.24	5	6	0.20	0.28	0.72
745.1	Transposition of great arteries	44	0.95	25	19	1.01	0.89	1.14
745.2	Tetralogy of Fallot	35	0.76	18	17	0.73	0.79	0.91
745.4	Ventricular septal defect	284	6.15	131	153	5.29	7.15	0.74
745.5	Atrial septal defect	391	8.47	211	180	8.51	8.42	1.01
745.6	Endocardial cushion defects	28	0.61	12	16	0.48	0.75	0.65
746.01-746.02	Pulmonary valve atresia/stenosis	77	1.67	35	42	1.41	1.96	0.72
746.1	Tricuspid valve atresia/stenosis	14	0.30	7	7	0.28	0.33	0.86
746.2	Ebstein's anomaly	9	0.19	4	5	0.16	0.23	0.69
746.3	Aortic valve stenosis	17	0.37	8	9	0.32	0.42	0.77
746.7	Hypoplastic left heart syndrome	24	0.52	17	7	0.69	0.33	2.10
747.0	Patent ductus arteriosus	571	12.37	287	284	11.58	13.28	0.87
747.1	Coarctation of aorta	46	1.00	27	19	1.09	0.89	1.23
747.3	Anomalies of pulmonary artery	132	2.86	59	73	2.38	3.41	0.70
748.0	Choanal atresia	18	0.39	9	9	0.36	0.42	0.86
748.5	Lung agenesis/hypoplasia/ dysplasia	31	0.67	21	10	0.85	0.47	1.81
749.0	Cleft palate alone	50	1.08	27	23	1.09	1.08	1.01
749.1-749.2	Cleft lip +/- cleft palate	58	1.26	30	28	1.21	1.31	0.92
750.3	Esophageal atresia/stenosis +/- Tracheoesophageal fistula	19	0.41	9	10	0.36	0.47	0.78
751.2	Atresia/stenosis of large intestine	33	0.71	17	16	0.69	0.75	0.92
750.5	Pyloric stenosis	123	2.66	101	22	4.07	1.03	3.96
751.3	Hirschsprung's disease	28	0.61	20	8	0.81	0.37	2.16

Table 2. Prevalence of Specific Major Birth Defects by Sex (cont.)

ICD-9 Code(s)	Malformation	Number	Total Prevalence*	Total Male	Total Female	Prevalence Male	Prevalence Female	Male/Female Ratio
751.6	Biliary atresia	2	0.04	1	1	0.04	0.05	0.86
752.6	Hypospadias and epispadias	294	6.37	290	4	11.70	0.19	62.55
753.0	Renal agenesis/dysgenesis	25	0.54	17	8	0.69	0.37	1.83
753.2/753.6	Obstructive genitourinary defects	127	2.75	83	44	3.35	2.06	1.63
753.5	Bladder exstrophy	1	0.02	1	0	0.04	0.00	- -
755.20-755.29	Reduction deformity - upper limbs	13	0.28	6	7	0.24	0.33	0.74
755.3	Reduction deformity - lower limbs	9	0.19	4	5	0.16	0.23	0.69
756.7	Anomalies of abdominal wall	42	0.91	24	18	0.97	0.37	2.59
754.30/.31/.35	Congenital hip dislocation	123	2.66	33	90	1.33	4.21	0.32
756.6	Anomalies of diaphragm	19	0.41	11	8	0.44	0.37	1.19
758.0	Down Syndrome (Trisomy 21)	72	1.56	31	41	1.25	1.92	0.65
758.1	Trisomy 13	8	0.17	4	4	0.16	0.19	0.86
758.2	Trisomy 18	17	0.37	7	10	0.28	0.47	0.60
760.7	Fetal Alcohol Syndrome	2	0.04	1	1	0.04	0.05	0.86
	Total	**2941**		**1672**	**1269**			

* per 1000 livebirths

Table 3. Prevalence of Specific Major Birth Defects by Branch of Service

ICD-9 Code(s)	Malformation	Army Number	Army Prev*	Navy Number	Navy Prev*	Air Force Number	Air Force Prev*	Marine Number	Marine Prev*	Other Number	Other Prev*
740.0/740.1	Anencephalus	4	0.21	3	0.29	0	0.00	0	0.00	0	0.00
741.1/741.9	Spina Bifida	5	0.27	7	0.67	7	0.64	0	0.00	2	1.63
742.0	Encephalocele	3	0.16	1	0.10	2	0.18	3	0.63	1	0.81
742.1	Microcephalus	5	0.27	9	0.86	4	0.36	2	0.42	1	0.81
742.3	Hydrocephalus w/o Spina Bifida	19	1.02	17	1.62	10	0.91	11	2.30	1	0.81
743.0/743.1	Anophthalmia/microphthalmia	2	0.11	1	0.10	1	0.09	2	0.42	0	0.00
743.30-743.34	Cataract	6	0.32	3	0.29	1	0.09	3	0.63	0	0.00
743.5	Aniridia	0	0.00	0	0.00	0	0.00	1	0.21	0	0.00
744.01/744.23	Anotia/microtia	2	0.11	2	0.19	2	0.18	1	0.21	0	0.00
745.0	Common truncus	2	0.11	3	0.29	5	0.46	1	0.21	0	0.00
745.1	Transposition of great arteries	14	0.75	10	0.95	12	1.09	8	1.67	0	0.00
745.2	Tetralogy of Fallot	13	0.70	9	0.86	9	0.82	4	0.84	0	0.00
745.4	Ventricular septal defect	112	5.99	63	6.00	67	6.11	35	7.33	7	5.70
745.5	Atrial septal defect	149	7.97	90	8.57	107	9.76	35	7.33	10	8.14
745.6	Endocardial cushion defects	10	0.53	8	0.76	7	0.64	3	0.63	0	0.00
746.01-746.02	Pulmonary valve atresia/stenosis	31	1.66	23	2.19	14	1.28	5	1.05	4	3.25
746.1	Tricuspid valve atresia/stenosis	6	0.32	4	0.38	3	0.27	0	0.00	1	0.81
746.2	Ebstein's anomaly	2	0.11	3	0.29	3	0.27	1	0.21	0	0.00
746.3	Aortic valve stenosis	6	0.32	7	0.67	2	0.18	2	0.42	0	0.00
746.7	Hypoplastic left heart syndrome	10	0.53	8	0.76	3	0.27	2	0.42	1	0.81
747.0	Patent ductus arteriosus	250	13.37	123	11.71	130	11.86	64	13.39	4	3.25
747.1	Coarctation of aorta	12	0.64	17	1.62	9	0.82	7	1.47	1	0.81
747.3	Anomalies of pulmonary artery	41	2.19	41	3.90	36	3.28	11	2.30	3	2.44
748.0	Choanal atresia	11	0.59	5	0.48	1	0.09	1	0.21	0	0.00
748.5	Lung agenesis/hypoplasia/dysplasia	18	0.96	6	0.57	5	0.46	1	0.21	1	0.81
749.0	Cleft palate alone	15	0.80	17	1.62	13	1.19	4	0.84	1	0.81
749.1-749.2	Cleft lip +/- cleft palate	19	1.02	15	1.43	14	1.28	8	1.67	2	1.63
750.3	Esophageal atresia/stenosis +/- Tracheoesophageal fistula	8	0.43	2	0.19	5	0.46	3	0.63	1	0.81
751.2	Atresia/stenosis of large intestine	15	0.80	5	0.48	8	0.73	4	0.84	1	0.81

Table 3. Prevalence of Specific Major Birth Defects by Branch of Service (cont.)

ICD-9 Code(s)	Malformation	Army Number	Army Prev*	Navy Number	Navy Prev*	Air Force Number	Air Force Prev*	Marine Number	Marine Prev*	Other Number	Other Prev*
750.5	Pyloric stenosis	53	2.83	27	2.57	22	2.01	17	3.56	4	3.25
751.3	Hirschsprung's disease	12	0.64	5	0.48	7	0.64	2	0.42	2	1.63
751.6	Biliary atresia	1	0.05	0	0.00	1	0.09	0	0.00	0	0.00
752.6	Hypospadias and epispadias	115	6.15	71	6.76	71	6.48	29	6.07	8	6.51
753.0	Renal agenesis/dysgenesis	15	0.80	7	0.67	3	0.27	0	0.00	0	0.00
753.2/753.6	Obstructive genitourinary defects	45	2.41	28	2.67	32	2.92	18	3.77	4	3.25
753.5	Bladder exstrophy	0	0.00	0	0.00	0	0.00	0	0.00	1	0.81
755.20-755.29	Reduction deformity - upper limbs	5	0.27	6	0.57	2	0.18	0	0.00	0	0.00
755.3	Reduction deformity - lower limbs	3	0.16	1	0.10	4	0.36	1	0.21	0	0.00
756.7	Anomalies of abdominal wall	10	0.53	14	1.33	8	0.73	8	1.67	2	1.63
754.30/.31/.35	Congenital hip dislocation	58	3.10	20	1.90	32	2.92	11	2.30	2	1.63
756.6	Anomalies of diaphragm	8	0.43	5	0.48	4	0.36	0	0.00	2	1.63
758.0	Down Syndrome (Trisomy 21)	29	1.55	15	1.43	18	1.64	10	2.09	0	0.00
758.1	Trisomy 13	3	0.16	3	0.29	2	0.18	0	0.00	0	0.00
758.2	Trisomy 18	9	0.48	2	0.19	1	0.09	5	1.05	0	0.00
760.7	Fetal Alcohol Syndrome	1	0.05	1	0.10	0	0.00	0	0.00	0	0.00
	Total	1157		707		687		323		67	

* per 1000 livebirths